APPENDIX F
CNEP SAMPLER SOPs

RM910A VOC Air Sampler SOP
and Field Sample Report Form

This SOP describes the procedure for collecting samples in summa (6L vacuum) canisters at the field site. The Field Sample Report Form serves as the CNEP's written documentation for each sample. This form is used in addition to any sample documentation form provided by the lab that prepared the sample canister and which will analyze the sample after collection. This SOP will be considered a Technical Advisory Document (TAD) by the CNEP.

SOP for VOC Trial Run Sample

This SOP describes the procedure for evacuating 6L canisters at the field site for trial (practice) sample runs.

Flow Verification Procedure for RM910A Canister Sampler

This SOP describes two procedures for verifying the flow rate of the RM910A canister sampler, both in the field and in the lab. One procedure uses a zero air source while the other procedure does not.

CNEP Canister Numbers for VOC Samples

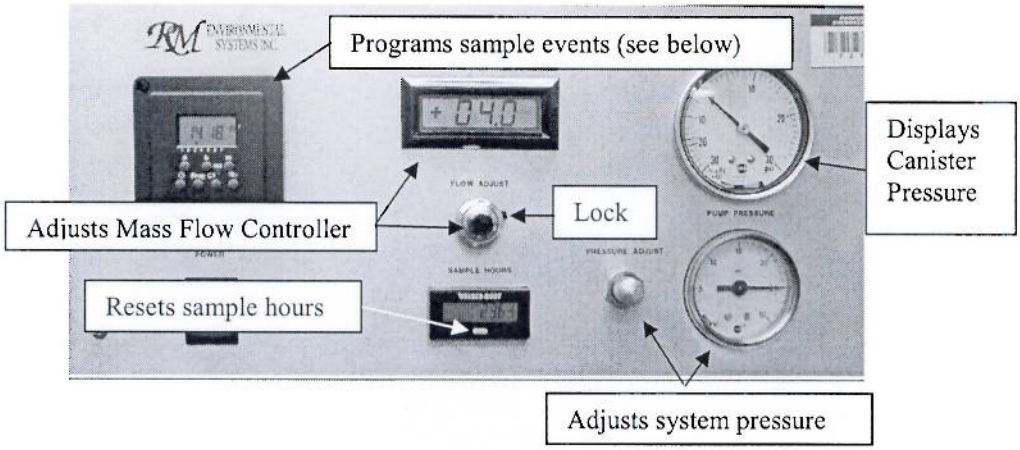
This list shows the unique serial number and/or unique engraved number on each of the 6-liter canisters used by the CNEP for sample collection during this project.

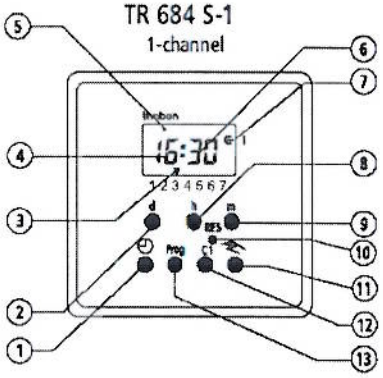
Canister Shipment Instructions and Sample Documentation Instructions

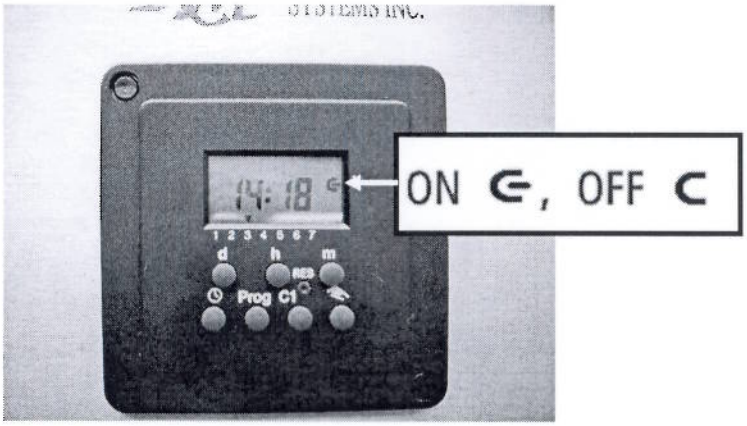
This e-mail message to CNEP staff describes in detail how sample canisters should be shipped to the lab for analysis. It also describes in detail what documentation (chain of custody) forms are needed for each sample canister and how that documentation is to be filled out. It also includes instructions on how to replace an invalid sample with a replacement sample.

RM910A VOC Air Sampler SOP

SOP Background Information Page – Figure 1, Controls and Displays







1 Clock (Press to display real time – hold down and press H or M to adjust)
2 Day of the week selection
3 Triangle above numbers indicates day of week (1 is Monday, 2 is Tuesday, etc.)
The triangle is moved by pressing the day (d) button
4 Hours display
5 Display for automatic summer/winter time switching (not used here)
6 Minutes display
7 Switching on/off display
8 Set hours
9 Set Minutes
10 RESET (DO NOT PRESS RESET)
11 Manual ON/OFF
12 C1 ON/OFF selections for programming ON ⋐, OFF ⊂
13 Program and program review button
Pressing Prog, then d, h, m simultaneously will delete past program dates. It is necessary to delete previous program times before setting new ones

SOP & Field Sample Report Form

Site Visit Date/Time:	Operator Name:
Exposed Canister Sample Date (ID):	Installed Canister Sample Date (ID):

(sample ID is the sample date in mmddyy format – add ID and other requested information to canister tag)

1. Record the following information relating to the exposed canister(s)

Sample Hours:_____ Canister Pressure (gage on canister):_____NA___

Canister Pressure (gage on 910A Sampler):_____

2. Close the valve on the single exposed canister; close valves on both canisters for duplicate samples

3. Press the manual on/off button on the 910A sampler to start the pump (don't let the pump run for more than 5-minutes). Let the readings stabilize, then record the following

Final flow rate:_____ Final System Pressure: _____

4. Adjust flow and pressure for the next scheduled sample date, if necessary. Pressure should be 23 PSIG in normal weather, but should be 20 PSIG when relative humidity is 90% or higher; flow should be approximately 3.4 cc/min for a single sample and approximately 6.8 cc/min for duplicate samples.

5. Stop the sampler pump by pressing the manual on/off button

6. Reset the sample hour meter

7. Remove the exposed canister from the sample line and attach the new canister(s) to the sample line.

For single samples:

Detach outlet line of RM910A from 1/4" to 1/8" adapter on single exposed canister.
NOTE: If the exposed canisters are duplicate samples, then detach outlet line of RM910A from coupling (tee) on stainless steel inlet tubing attached to exposed duplicate canisters (**Figure 2**).
Remove 1/4" to 1/8" adapter from the single exposed canister or from each of the exposed duplicate canisters; seal each exposed canister with its own cap.
Place stainless steel inlet tubing and tee for duplicate samples, along with extra adapter, into sealed plastic bag.
Remove cap from single new canister.
Attach 1/4" to 1/8" adapter to new canister; tighten with fingers, then ¼ to 1/3 turn with wrench.
Attach outlet line of RM910A to adapter on new canister.

For duplicate samples:

Detach outlet line of RM910A from 1/4" to 1/8" adapter on single exposed canister.
Remove 1/4" to 1/8" adapter from the single exposed canister and seal exposed canister with its own cap.
Remove cap from each of the two new duplicate canisters.
Attach 1/4" to 1/8" adapter to each new canister (extra adapter is in sealed plastic bag with tubing and tee for duplicate samples); tighten with fingers, then ¼ to 1/3 turn with wrench.
Remove stainless steel inlet tubing and tee for duplicate samples from sealed plastic bag.
Attach stainless steel inlet tubing for duplicate samples to adapters on each of the new duplicate sample canisters.

Attach outlet line of RM910A to coupling (tee) on stainless steel inlet tubing attached to exposed duplicate canisters (**Figure 2**).

8. Open valve on (each) new canister, turning valve just until resistance on knob is minimal. Check vacuum of (each) new canister as displayed on canister pressure gauge of RM910A. Pressure in duplicate canisters is equalized as soon as valves on both canisters are open. New canister pressure should be -29 or -30 inches of Hg. If pressure is higher (for example, -25), then canister(s) is/are unusable.

9. Program the new sample event (start at 23:55 hours the day before the sample day – 5 min. purge)
   Press Prog
   Press d, h, and m simultaneously to delete old program
   Be sure the on symbol is displayed (press C1 to change)
   Press d to display the day before the next sample event (1 is Monday, 2 is Tuesday...)
   Press h and m to set time to 23:55
   Press Prog twice
   Be sure the off symbol is displayed (Press C1 to Change)
   Set the stop time for 0:00 Hours on the day after the sample day
   Press Prog twice to store setting
   Press clock to return to real time
   Press Prog to check settings and record the information below – return to real time

   Circle Set Start Day 1 2 3 4 5 6 7 Enter Set Start Time:_____

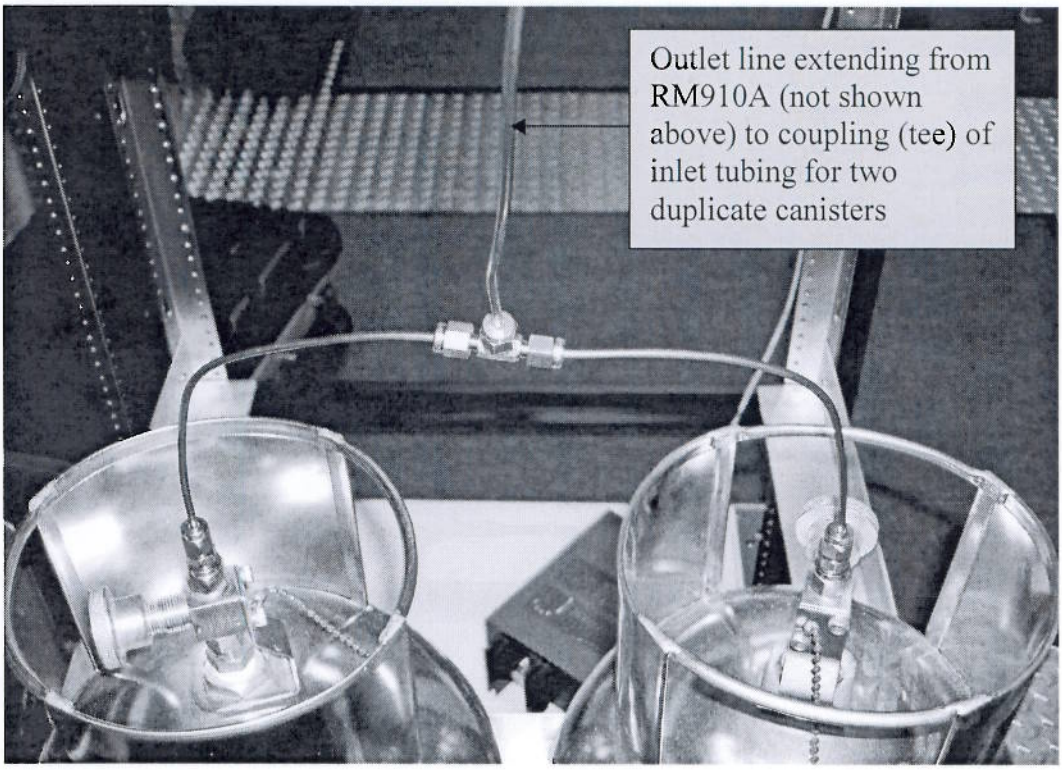
   Circle Set Stop Day 1 2 3 4 5 6 7 Enter Set Stop Time:_____

11. Record the following information relating to the newly installed canister(s)

Canister Pressure (on canister):_____NA____ Canister Pressure (on 910A Sampler):_____

12. Ship exposed canister(s) to lab for analysis

Figure 2, Connection of Outlet Line to Canisters



SOP FOR VOC TRIAL RUN SAMPLE

The performance of the RM910A air toxics (VOC) sampling system can be checked by means of trial runs (practice samples) using one or both Graseby 6L vacuum canisters. The canisters must be evacuated by means of the following procedure prior to the trial run.

Equipment needed for trial run

Large vacuum pump (Thomas 115V, 60Hz)
Stainless steel or other metal intake line with 1/4-inch to 1/8-inch adapter
One or two Graseby 6L vacuum canisters
¼-inch to 1/8-inch adapter (one for each canister)
Coupling (tee) and stainless steel intake lines for canisters (if using both canisters)
7/16-inch box end wrench or crescent wrench for adapters and couplings

Procedure for evacuating canisters

1. Connect intake (vacuum) line from pump to adapter on single canister. If using duplicate canisters, connect stainless steel inlet tubing to 1/4"-1/8" adapter on each canister, then connect intake (vacuum) line from pump to coupling (tee) for duplicate canisters (see **Figure 1**).

2. Open valve on each canister.

3. Plug power cord of pump into wall socket. Allow pump to pull vacuum for 20 minutes in order to evacuate canisters.

4. Close valve on each canister, then unplug power cord of pump from wall socket.

5. Disconnect intake (vacuum) line of pump from adapter on single canister or from coupling (tee) for duplicate canisters.

6. Connect stainless steel outlet line from RM910A to adapter on single canister or to coupling (tee) for duplicate canisters.

7. Open valve on each canister and check vacuum on canister pressure gauge on RM910A. Canister pressure should be -29 or -30 inches of Hg. If canister pressure is higher (for example, -27), then repeat steps 1 through 6 of this SOP.

8. When canister pressure is -29 or -30 inches of Hg, then program the RM910A for a simulated sample run according to the *RM910A VOC Air Sampler SOP*.

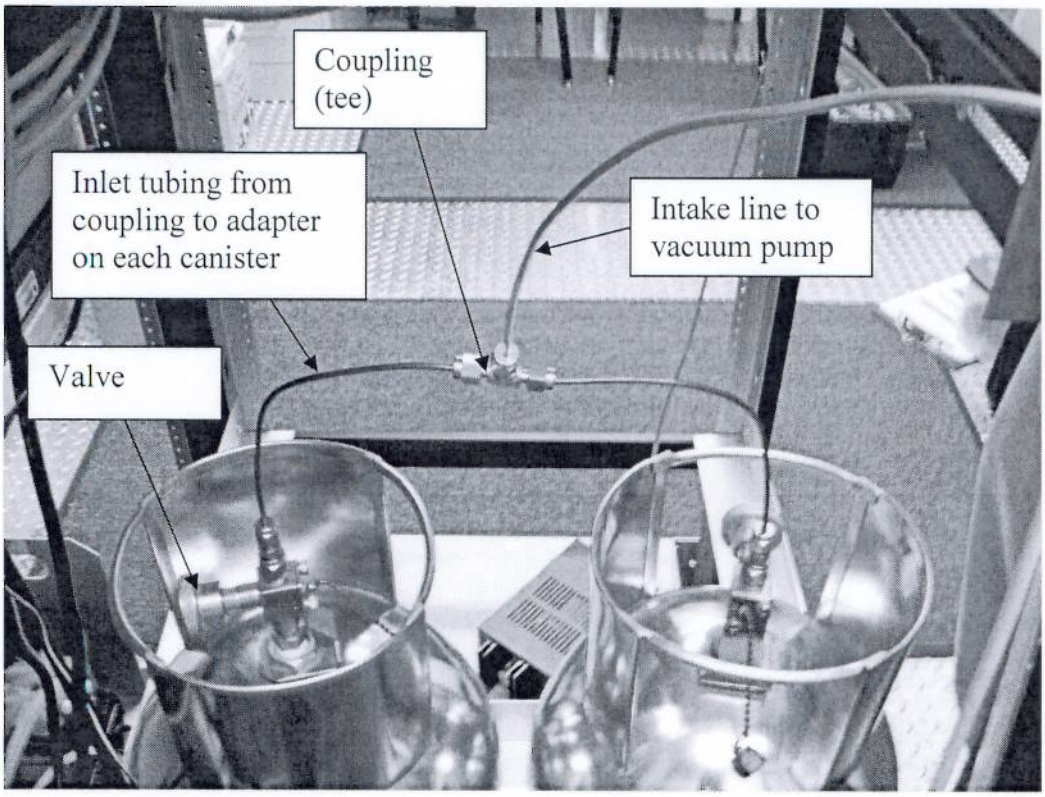


Figure 1. Two Graseby 6L vacuum canisters set up to be evacuated by large vacuum pump. Vacuum pump is not shown.

FLOW VERIFICATION PROCEDURE
For
RM910A CANISTER SAMPLER

Equipment needed:
RM910A Canister Sampler
Hastings Model HBM-1A Primary Standard bubble-type volumetric flow meter
Stopwatch, soap solution, squeeze bulb, thermometer, and *Correction Factors* reference table for volumetric flow meter
Perma Pure zero air generator and tubing (optional)
Two long pieces of neoprene (surgical) plastic tubing with connections to fit RM910A and flow meter; one piece of tubing must have 15 or 20 psi pressure gauge attached
Crescent wrenches for connecting tubing to RM910A and flow meter
Absolute pressure manometer
Laptop computer and memory stick for Pryor (contains flow verification procedure form)
Calculator
Record Storage Book (bound logbook) for Community Air Toxics Study or other relevant project

Flow Verification Procedure without using Zero Air Source

1. Turn on laptop and open flow verification procedure form on Pryor memory stick. Record start time for flow check and other preliminary information. Begin logbook entries in the "Community Air Toxics Study" Record Storage Book or other appropriate bound logbook.

2. If performing this flow verification at the Pryor field site, disconnect the metal outlet tube (which leads down to the sample canisters) from the RM910A and cap the free end of this tube. If performing this flow verification in lab, take caps off the inlet and outlet ports of RM910A. Bypass port on RM910A should be uncapped when performing flow verification at field site or in lab.

3. Set up volumetric flow meter, using 10 cc graduated cylinder (bubble tube). Fill center well at bottom of flow meter with soap solution to within 1/8-inch of lip at bottom of graduated cylinder. Attach squeeze bulb to top of side reservoir. Connect outlet port on back of RM910A with port on side of soap filled center well of flow meter using neoprene plastic tubing.

4. Press the manual on/off button on the RM910A to start the sampler pump. Adjust the flow rate of the RM910A to 3.5 cc/min and let it stabilize.

5. Prime the volumetric flow meter by squeezing bulb on top of side reservoir to send a soap bubble up the graduated cylinder. Repeat this step until you can consistently send a *single* bubble up the entire length of the cylinder at a time.

6. Measure the ambient temperature and ambient atmospheric pressure inside the Pryor shelter or inside the lab using the thermometer included with the flow meter and using the absolute pressure manometer. Record these temperature and pressure values in the flow verification procedure form.

7. Perform a flow check with the RM910A flow rate set at 3.5 cc/min. Use the squeeze bulb to send a single soap bubble up the 10 cc graduated cylinder. Use the stopwatch included with the volumetric flow meter to measure the time it takes the top of the soap bubble to rise from the 0 cc line to the 10 cc line on the cylinder. Record this time and the RM910A flow rate in the flow verification procedure form. The "volume" column on this form should show a value of 0.010 liters (10 cc). Repeat this step at least once to ensure a consistent result.

8. Repeat step 7, with the flow rate of the RM910A set to 7.0 cc/min.

9. Repeat step 7, with the flow rate of the RM910A set to 10.0 cc/min.

10. The "reference flow" column of the flow verification procedure form shows the uncorrected flow rates measured by the volumetric flow meter. These flow rates are influenced by ambient temperature and ambient atmospheric pressure and must be corrected to conditions of standard temperature (298 degrees Kelvin) and standard pressure (760 mm Hg). To do this, find the correction factor corresponding to the ambient temperature and pressure (measured in step 6 above) in the *Correction Factors* reference table included with the volumetric flow meter. Enter this correction factor in the appropriate blank in the flow verification procedure form. Click on "save" and the correction factor will automatically correct the "reference flow", "difference", and "% difference" values for each flow check performed in steps 7 through 9 above.

11. The corrected values for "% difference" should be ± 10 %. Furthermore, the graph on the flow verification procedure form should show a linear relationship between the flow rates of the RM910A and the volumetric flow meter. If the "% difference" values are greater than 10%, or if the graph shows a non-linear relationship, then there may be a problem with the mass flow controller of the RM910A or there may be a leak in the RM910A air flow system.

12. Complete flow verification procedure form and print two copies of it (one for the air toxics project files at Pryor, and one for the air toxics project files at the CNEP office). Complete entries in the bound logbook for the appropriate air toxics project.

13. Adjust the flow rate of the RM910A to 3.5 cc/min and let it stabilize. Press the manual on/off button on the RM910A to turn off the sampler pump.

14. Disassemble the volumetric flow meter and clean the graduated cylinder and soap well with distilled water.

15. If performing this flow verification at the Pryor field site, connect the metal outlet tube (which leads up from the sample canisters) to the outlet port of the RM910A. If performing this flow verification in lab, replace the caps on the inlet and outlet ports of RM910A. Bypass port on RM910A should be capped when the RM910A is not in use in the lab or on site.

Flow Verification Procedure using Zero Air Source

1. Turn on laptop and open flow verification procedure form on Pryor memory stick. Record start time for flow check and other preliminary information. Begin logbook entries in the "Community Air Toxics Study" Record Storage Book or other appropriate bound logbook.

2. If performing this flow verification at the Pryor field site, disconnect the metal outlet tube (which leads down to the sample canisters) from the RM910A and cap the free end of this tube. Disconnect the metal inlet tube from the inlet port of the RM910A and cap the free end of this tube. If performing this flow verification in lab, take caps off the inlet and outlet ports of RM910A. Bypass port on RM910A should be uncapped when performing flow verification at field site or in lab.

3. Set up volumetric flow meter, using 10 cc graduated cylinder (bubble tube). Fill center well at bottom of flow meter with soap solution to within 1/8-inch of lip at bottom of graduated cylinder. Attach squeeze bulb to top of side reservoir. Connect outlet port on back of RM910A with port on side of soap filled center well of flow meter using neoprene plastic tubing.

4. Press the manual on/off button on the RM910A to start the sampler pump. Adjust the flow rate of the RM910A to 3.5 cc/min and let it stabilize.

5. Measure the ambient temperature and ambient atmospheric pressure inside the Pryor shelter or inside the lab using the thermometer included with the flow meter and using the absolute pressure manometer. Record these temperature and pressure values in the flow verification procedure form.

6. Set up the Perma Pure zero air generator and turn it on. Adjust the outlet flow knob so the flow of air from the zero air outlet is minimal. Connect one end of the neoprene plastic tubing with the attached pressure gauge to the zero air outlet. Connect the other end of this tubing to the inlet port on the RM910A. *The pressure shown on the pressure gauge of this tubing should not exceed ambient air pressure, as measured with the absolute pressure manometer, as excessive pressure may damage the RM910A.* Monitor the pressure shown on the tubing pressure gauge throughout the flow verification process to ensure that it does not climb above ambient air pressure.

7. Prime the volumetric flow meter by squeezing bulb on top of side reservoir to send a soap bubble up the graduated cylinder. Repeat this step until you can consistently send a *single* bubble up the entire length of the cylinder at a time.

8. Perform a flow check with the RM910A flow rate set at 3.5 cc/min. Use the squeeze bulb to send a single soap bubble up the 10 cc graduated cylinder. Use the stopwatch included with the volumetric flow meter to measure the time it takes the top of the soap bubble to rise from the 0 cc line to the 10 cc line on the cylinder. Record this time and the RM910A flow rate in the flow verification procedure form. The "volume" column on this form should show a value of 0.010 liters (10 cc). Repeat this step at least once to ensure a consistent result.

9. Repeat step 8, with the flow rate of the RM910A set to 7.0 cc/min.

10. Repeat step 8, with the flow rate of the RM910A set to 10.0 cc/min.

11. The "reference flow" column of the flow verification procedure form shows the uncorrected flow rates measured by the volumetric flow meter. These flow rates are influenced by ambient temperature and ambient atmospheric pressure and must be corrected to conditions of standard temperature (298 degrees Kelvin) and standard pressure (760 mm Hg). To do this, find the correction factor corresponding to the ambient temperature and pressure (measured in step 5 above) in the *Correction Factors* reference table included with the volumetric flow meter. Enter this correction factor in the appropriate blank in the flow verification procedure form. Click on "save" and the correction factor will automatically correct the "reference flow", "difference", and "% difference" values for each flow check performed in steps 8 through 10 above.

12. The corrected values for "% difference" should be ± 10 %. Furthermore, the graph on the flow verification procedure form should show a linear relationship between the flow rates of the RM910A and the volumetric flow meter. If the "% difference" values are greater than 10%, or if the graph shows a non-linear relationship, then there may be a problem with the mass flow controller of the RM910A or there may be a leak in the RM910A air flow system.

13. Complete flow verification procedure form and print two copies of it (one for the air toxics project files at Pryor, and one for the air toxics project files at the CNEP office). Complete entries in the bound logbook for the appropriate air toxics project.

14. Disconnect the neoprene tubing from the inlet port of the RM910A. Turn off the zero air generator and disconnect the tubing from the zero air outlet.

15. Adjust the flow rate of the RM910A to 3.5 cc/min and let it stabilize. Press the manual on/off button on the RM910A to turn off the sampler pump.

16. Disassemble the volumetric flow meter and clean the graduated cylinder and soap well with distilled water.

17. If performing this flow verification at the Pryor field site, connect the metal outlet tube (which leads up from the sample canisters) to the outlet port of the RM910A. Connect the metal inlet tube from the shelter roof to the inlet port of the RM910A. If

performing this flow verification in lab, replace the caps on the inlet and outlet ports of RM910A. Bypass port on RM910A should be capped when the RM910A is not in use in the lab or on site.

CNEP CANISTER NUMBERS
FOR VOC SAMPLES
20 November, 2006

Canister Type	Volume	Serial No.	Number Engraved on Bottom of Canister	Notes
Restek	6L	2284	20-51005	
Restek	6L	2275	47-51005	
Restek	6L	2280	40-51005	
Restek	6L	2272	37-31005	
Restek	6L	2276	22-51005	
Restek	6L	3627	35-82606	
Restek	6L	3628	19-82606	
Graseby	6L	3357	none	
Graseby	6L	3359	none	

Kent Curtis

From: Kent Curtis
Sent: Wednesday, September 20, 2006 5:19 PM
To: CNEP-AirNow; 'Julie.Swift@erg.com'
Subject: FW: Instructions for collecting VOC samples and for shipping VOC canisters

We have received four of our five CNEP Restek canisters back from ERG and I expect the fifth one to arrive on Thursday. ERG also sent us a Restek canister that is not a CNEP canister. When we received these canisters I found that ERG had already assigned each canister to a particular sample date. I wasn't expecting that, but it's OK with me. Just make sure you set up the canister or canisters to sample on the date to which each has been assigned. The canister assignments are as follows:

CNEP canister number 2284 - Sept. 26

CNEP canister numbers 2275 and 2272 (duplicate samples) - October 2

CNEP canister number 2280 - October 8

Non-CNEP canister number 2242 - October 14

Notice also that ERG is using the four-digit serial number on the sticker on the side of the canister as the canister number. ERG is not using the number engraved on the bottom of the canister is the canister number. This is OK with me. Therefore, we'll use the four-digit serial number as the "CNEP canister number". The engraved number on the bottom of the canister will serve as an additional canister ID number in case the serial number on the sticker wears off through use.

When setting up the canisters to sample at the Pryor site, set the flow rate of the RM910A sampler to 3.4 cc/min for a single sample and to 6.8 cc/min for the duplicate samples.

I have not completed setup of the Excel spreadsheet for tracking samples on the main computer in my office yet. Until this is done, just use the "Proposed Sample Dates" schedule attached to this e-mail to keep track of the samples. Fill in the CNEP canister number assigned to each sample date in the appropriate blank on the schedule (using both electronic and hard copies) and make sure everyone has a copy of it. [I will do this when I am in the office. Someone else on staff must do it when I'm away on business or annual leave.] Fill in the "Notes" blank on this schedule if there is any important information (problems, use of non-CNEP canister, notable weather or events on sample date, etc.) for a given sample.

Kent

-----Original Message-----
From: Kent Curtis
Sent: Thursday, September 07, 2006 4:51 PM
To: CNEP-AirNow
Cc: 'Julie.Swift@erg.com'; 'Rodney.Williams@erg.com'
Subject: Instructions for collecting VOC samples and for shipping VOC canisters

CNEP Air Staff, you need to read this entire message (I'm sorry it's so long, but the information is essential). Julie and Rodney, this message is for your records and FYI. Review it and let me know if you have any comments.

CANISTER SHIPMENT INSTRUCTIONS

I spoke with Julie Swift of ERG this afternoon and we agreed on the following things regarding shipment of our VOC canisters.

We will ship our canisters via Federal Express to ERG. The shipping address is:

Rodney Williams
Eastern Research Group (ERG)
601 Keystone Park Drive, Suite 700
Morrisville, North Carolina 27560
919-468-7923

Julie said ERG will pay for the shipping, so we should mark the FedX form "Bill to Recipient", using the following ERG account code:

3076-9832-3

The sample canister(s) should be shipped the day they are collected or the day after collection. ERG cannot receive canisters on Saturday or Sunday, so if you are shipping canisters on a Friday, mark the "Standard Overnight, next business afternoon, (no Saturday delivery available)" box on the FedX form.

We can use our own cardboard boxes to ship canisters to ERG. Each canister costs $435, so put some bubble wrap inside the box to lessen the chance for damage to the canister. ERG keeps plenty of boxes on hand for shipping canisters to their clients. Thus ERG will replace our shipping boxes with their own when our boxes wear out. Nevertheless, we can order some spare boxes of our own so we'll have them if we need them.

SAMPLE DOCUMENTATION INSTRUCTIONS

We go LIVE, collecting our first VOC sample on Tuesday, September 26th. That means the first canister will have to be set up to sample at Pryor no later than Monday, September 25th. That first canister will have to be collected on Wednesday, September 27th and shipped to ERG. Let me know who is going to load that first sample, as I will be in New Mexico the week of September 25th.

The "Proposed Sampling Schedule" attached to this e-mail is now the official sampling schedule. April and I will convert it to an Excel file and put it on the Air Computer. After you collect a sample, you should fill in the Excel file with your initials, the date you collected the sample, the date the sample was shipped to ERG, and any comments you might have about that sample. The Excel file will be similar, but not identical, to the forms we use for PM2.5 filter disks.

Two forms must be filled out at the Pryor site when loading and collecting VOC canisters: an ERG "Toxics/SNMOC Sample Data Sheet" and our own "SOP & Field Sample Report Form". Some of the information is redundant between these two forms, but we still need to fill both of them out. We will keep a copy of each form for each sample in the file cabinet at the Pryor site and in the "Pryor VOC" file in my office. Instructions for filling out the ERG "Toxics/SNMOC Sample Data Sheet" are as follows:

ERG will include a "Toxics/SNMOC Sample Data Sheet" with each canister it ships us. When we set up a canister to sample at the Pryor site, we must fill in the "Field Setup" blank on the ERG form. The "setup date" is not the same as the sample date. The flow rate (MFC setting) of our RM910A sampler must be 3.4 to 3.5 cc/min. for a single sample and 6.8 to 7.0 cc/min. for a duplicate sample. [The pump pressure setting should remain at 23 PSIG for all samples.] The initial canister pressure should be -29 inches of Hg.

Each Restek canister that we are using to collect samples for this project has its own unique number engraved on the bottom of it. This engraved number (for example, 20-51005) is the "CNEP Canister Number" shown in the Excel file described above. ERG will use this number, too. Thus you will see this number marked in the "Canister Number" blank in the upper right corner of the ERG "Toxics/SNMOC Sample Data Sheet". This canister number should correspond to the "Collection Date" marked in the "Lab Pre Sampling" box on the ERG form and in our Excel file. Be sure to setup the proper canister for the day it is supposed to sample (see the Sample Schedule on the Excel file). It doesn't really matter which canister is assigned to a particular sample date, but once a canister is assigned a particular date, it must run on that date. To avoid confusion, I will assign canisters to particular sample dates. If I can't do this because of an extended absence from the office, anyone else can do it, so long as they fill in the Excel file with the canister numbers assigned to each date.

When we collect the canister after sampling, we must fill in the "Field Recovery" blank on the ERG form. The final canister pressure must be -1 to -5 inches of Hg. If the final canister pressure is 0.0 or positive, the sample is invalid. If the sample is invalid, ship the canister to ERG anyway so they can clean and prepare it for reuse. Then call Julie Swift at 919-468-7924 or Rodney Williams at 919-468-7923 and ask them to send us a "makeup canister" immediately. We will use the makeup canister to collect a "makeup sample" on a 1-in-3 day schedule (instead of the usual 1-in-6 day schedule). For example, if a sample collected on October 2nd is invalid, the makeup sample should run on October 5th, if possible, or on October 11th at the latest. When you finish filling in the "Field Recovery" blank on the ERG form, keep the pink copy of the form for our records (make one copy to keep at the Pryor site, and keep the pink original in the Pryor VOC file in my office). Pack the white and yellow copies in the box with the canister for shipment back to ERG.

And don't forget to fill in our bound record book at the Pryor site when you setup and collect VOC sample canisters. I know there's a lot of paperwork and recordkeeping involved with this project, but these records are important for QA/QC and data validation.

ERG has assigned us the "Site Code" of "CNEP". You will see this code in the top left corner of the ERG "Toxics/SNMOC Sample Data Sheet".

I will finish revising the QAPP/Work Plan for our VOC project in a few days. I urge all of you to read it (the narrative is only 20 pages long), as it tells you what we're doing, how we're doing it, and why we're doing it. It will include copies of all our SOPs in Appendix F and the Sampling Schedule in Appendix G. So you should be able to find everything you need to know about the VOC project in the project QAPP/Work Plan.

Kent Curtis
CNEP

EASTERN RESEARCH GROUP, INC.

ERG Lab ID #: _____

Toxics/SNMOC Sample Data Sheet

LAB PRE SAMPLING

Site Code: CNEP
City / State: Pryor, Okla.
AIRS Code: 40-097-9014
Collection Date: _____
Options
SNMOC (Y/N): _____
TOXICS (Y/N): y

Canister Number: _____
Lab Initial Can. Press. ("Hg): _____
Duplicate Event (Y/N): _____
Duplicate Can #: _____
Date Can. Cleaned: _____
Cleaning Batch #: _____

FIELD SETUP

Operator: _____ Sys. #: _____
Setup Date: _____
Field Initial Can. Press. ("Hg): _____

MFC Setting: _____
Elapsed Timer Reset (Y/N): _____
Canister Valve Opened (Y/N): _____

FIELD RECOVERY

Recovery Date: _____
Field Final Can. Press. ("Hg): _____

Sample Duration (3 or 24 hr): _____
Elapsed Time: _____
Canister Valve Closed (Y/N): _____

LAB RECOVERY

Received by: _____ Date: _____
Sample Login Date: _____
If void, why: _____

Lab Final Can. Press. ("Hg): _____
Status (valid/void): _____

SNMOC

Analyst: Date: _
Data File Name: _____ Dup. File Name: _____ Rep. File Name: _____
-

TOXICS

Analyst: Date: _
Data File Name: _____ Dup. File Name: _____ Rep. File Name: _____
-

Comments:

White: Sample File Copy Yellow: Receiving Copy Pink: Field Copy

Kent Curtis

From: Kent Curtis
Sent: Wednesday, August 09, 2006 4:56 PM
To: OES - Air Now
Subject: RM910A flow rates and pump pressures

I spoke with Mike Pardee of R&M (805-384-9265 ext. 11) about flow rates and pump pressures on our RM910A VOC sampler at Pryor.

Mike said adjusting the pump pressure on the RM910A has no effect on the flow rate of the sampler nor on the final pressure in the sample canister. He recommended that we adjust the pump pressure to somewhere in the range of 20 to 25 PSIG. Such a pump pressure should work well in Oklahoma's climate. In very humid climates (Florida Everglades, where relative humidity is often higher than 90%), the pump pressure would have to be adjusted to a lower range; but with relative humidities in Oklahoma (generally in the range of 30% to 60%) the pump pressure can be set to a range of 20 to 25 PSIG. The higher the pump pressure, the more likely it is that moisture from the air will get into our samples and into the mass flow controller of the RM910A. This may be a problem for us only if we're sampling on a very rainy, wet, humid day, or if the air conditioning or heating quits working in the shelter, causing moisture to condense in the instrument. If such a problem were to occur, we would notice it by the way it would affect the mass flow controller. That is, if moisture gets into the mass flow controller, then it will not be able to maintain a steady flow rate during sample collection. We would see this when we check the flow rate during sample canister collection (step 3 of the attached SOP) and by the wide variation in final canister pressures, which could be positive or negative. If water gets into the mass flow controller, we might be able to fix the problem by blowing compressed nitrogen from a cylinder through the mass flow controller; but if water causes corrosion in the mass flow controller, then we would have to ship the RM910A back to R&M for expensive repairs. Anyway, **I may recommend that we set the pump pressure on the RM910A to 23 PSIG - the middle of the range recommended by Mike.**

Mike said the diaphragm pump we're using to evacuate our Graseby canisters for trial runs can't pull a vacuum to -29 or below. He also said the canister pressure gauge on the RM910A has an accuracy range of about plus or minus 3%. Thus, if the canister pressure gauge on our RM910A shows a pressure of -29.5 inches of Hg, then the actual canister pressure might be about 28 or 28.5 inches of Hg. We should keep this in mind when calculating the flow rate needed to achieve the desired final canister pressure. We should check with the lab we select to see what final canister pressure the lab prefers. If the final canister pressure is negative, the lab may have to inject nitrogen into the canister in order to extract a sample. On the other hand, if the final canister pressure is positive, then the lab can extract a sample from it without having to inject nitrogen. **So the jury is still out as to what the final pressure in our sample canisters should be. I'll have to consult with the lab we select and see what final canister pressure they prefer for method TO-15.**

In the meantime, we'll continue to perform trial runs, adjusting the flow rate of the sampler until we achieve a final canister pressure of -2 or -3. We may also adjust the pump pressure to 23 PSIG.

Kent

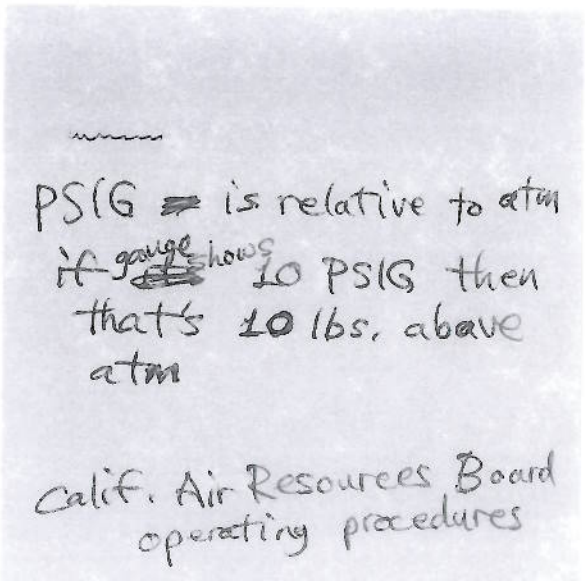


TABLE OF TRIAL RUNS
Using Graseby 6L Canisters

TRIAL RUN	DATE	SAMPLE TIME (HRS.)	DUPLICATE OR SINGLE SAMPLE	FLOW RATE (cc/min.)	MASS FLOW CONTROLLER VOLTAGE SETTING (volts)	RM910A PUMP PRESSURE SETTING (PSIG)	INITIAL CANISTER PRESSURE (in. of Hg)	FINAL CANISTER PRESSURE (in. of Hg)
1	7/18/06	24:00	D	8.0		18	-29	+3
2	7/24/06	24:00	D	8.0		17.5	-28	+2.5
3	7/28/06	24:00	D	7.8	3.82	25?	-29.5	0.0
4	8/4/06	24:00	D	7.5	3.70	23?	-29.5	-1.0
5	8/9/06	24:00	D	7.5	3.70	25	-29.5	0.0
6	8/11/06	24:00	D	7.3	3.60	25	-29	-2.0
7	8-18-06	24:00	D	7.1	3.50	23	-29	-0.0
8	8/24/06	24:00	D	6.8	3.40?	23	-29.5	-4.5
9	8-31-06	24:00	D	6.8	3.34	23.5	-29	-5.0
10	9-4-06		S	3.4	1.76	24	-29	

12 July, 2006 — Flow checks of RM910A (cont'd.)

METHOD FOR CALCULATING FLOW RATES FOR VOC SAMPLES USING RM910A SAMPLER

To completely fill a 6L (i.e., 6000 cc) vacuum sample canister to 1 atm. of pressure during a 24 hr. (i.e., 1440 min.) sample period, the flow rate of the RM910A sampler would have to be 4.167 cc/min., as shown by the equation

$$\frac{6000\ cc}{1440\ min.} = 4.167\ cc/min.$$

But final pressure of sample canister at end of sample period must be less than 1 atm., i.e., canister pressure must be no higher than −3 in. of Hg, as shown on canister pressure gauge of RM910A sampler. So, if initial pressure of sample canister before sample period is −30 in. of Hg, then maximun flow rate of RM910A during 24 hr. sample period must be no higher than 3.75 cc/min. to achieve a final canister pressure of −3 in. of Hg.

$$\text{flow rate} = \frac{(\text{canister pressure}_{\text{final}})(\text{canister volume})}{1440\ min.}$$

$$\text{flow rate} = \frac{(0.9)(6000\ cc)}{1440\ min.} = 3.75\ cc/min.$$

Thus the flow rate of the RM910A for a single sample canister must be approximately 3.75 cc/min. (which corresponds to a mass flow controller setting on the RM910A of volts);

The flow rate of the RM910A for a duplicate sample (2 canisters) must be approximately 7.50 cc/min. (which corresponds to a mass flow controller setting on the RM910A of volts).

Kent Curtis 7/21/06